Keio University

Thesis Abstract

No.

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Title of Thesis:

Methods for Quality Assurance of Volunteered Geographic Information in Tree Inventory Spatial Databases

Summary of Thesis:

Despite the considerable benefits of using of Volunteered Geographic Information (VGI) for enriching and updating tree inventory databases, skepticism regarding the data quality remains one of the main barriers to deploying VGI for creating authoritative tree inventories. Therefore, developing effective and robust VGI quality assurance procedures for verifying, validating, and improving VGI quality in tree inventory databases may help overcome concerns regarding VGI's fitness for serious scientific and professional applications. This thesis addressed three different open problems in the area of data quality assurance in crowdsourced tree inventory databases. First, it focused on the quality assurance of VGI that has been collected across the globe for Citizen Science (CS) tree species diversity monitoring programs and proposed an intrinsic quality indicator under the umbrella of trust notion for assuring the quality of VGI. Second, this research concentrated on improving the VGI quality in tree inventory databases that were established for inventorying trees in private urban orchards. To this end, a collective sensing approach was proposed for improvement of the completeness of the obtained VGI in crowdsourced tree species diversity inventory databases. Finally, the thesis proposed different possible ex-post and ex-ante architectures for creating a quality assurance system for validating and improving the quality of the generated VGI in collaborative crowdsourcing platforms for tree species inventories. The proposed conceptual models empower the end user (data consumer), expert reviewers, and volunteers (data producers) to perform more robust and precise VGI quality assurance practices.

Keywords: Volunteered Geographic Information, Citizen Science, Crowdsourcing, Spatial Data Quality, Trust, Collective Sensing, Tree Inventory